FABRIC COLUMN AND PAD CONCRETE FORM

CROSS REFERENCE TO RELATED APPLICATIONS

This application claims priority under 35 U.S.C 119(E)e to the United States Provisional Patent Application Number 60/420,029 filed on 10/22/2002, which received Confirmation Number 4435, the disclosure of which is incorporated herein by reference.

FIELD OF THE INVENTION

This invention relates generally to a concrete column and pad forming tube made of a fabric like material for receiving a flowable and settable material poured into the interior of the tube so as to form a round column or pad upon the hardening of the material, and which is characterized by folding flat for storage and shipping, while at the same time being able to be accurately positioned on the job site.

BACKGROUND OF THE INVENTION

Concrete column forming tubes are conventionally formed of multiple layers of paper, which are spirally wound around a mandrel and with a wall thickness of about 6 mm so that the tube is rigid and maintains it's circular cross section. Because of the large diameters and lengths, transportation and storage is very expensive.

In an effort to overcome these problems, it was proposed in US Patent Number 5,376,316 to have extremely thin and flexible paper walls, which would render the tube collapsible into a flat form so as to avoid the high transportation and storage expenses of the rigid cardboard tubes. While the use of the thin walls did make the tube collapsible, the following problems resulted: First, there was no means of holding the tube in position so that when filled with concrete, the column was correctly located. The patent contemplated an exterior framework so as to hold the tube correctly, but this would add considerably to the expense. Second, in order for the tube to fold flat for shipping, the paper layers would have to be very thin, and this thinness led to bulging, and possible form failure, particularly at the bottom of the column where the pressures were highest. Again, this would require reinforcement on the outside, defeating the purpose of the collapsible tube form. Third, the patent contemplates an alternative for vertically supporting the tube by cutting a series of notches in the upper end, which are folded outwardly over a circular supporting framework. Again, this would require additional bracing and labor, obviating the benefits of the collapsible form.

OBJECT AND SUMMARY OF THE INVENTION

Accordingly, it is the object of this invention to provide an improved collapsible tube form that overcomes the problems set forth above.

The above and other objects and advantages of the present invention are achieved by the discovery that such forming tubes may be fabricated from fabric with one or more longitudinal tabs running the full length of the tube. Each tab is sandwiched between two vertical support members, which are used to properly locate the tube on the job site, before filling with concrete.

This invention also contemplates the use of a woven fabric of sufficient strength that bulging will not occur, while at the same time being able to fold flat. The fabric is joined into a tube by welding, sewing or zippering the edges together.

In a preferred embodiment, the fabric based forming tube is collapsed and folded into a small package to facilitate its storage and transportation. On the jobsite, the contractor cuts off the exact length of tube required for the column. The fabric tab is nailed or screwed between two vertical support members probably made from 75mm by 200 mm lumber, and the assembly is placed vertically into position and braced. Concrete is then poured into the fabric tube so that it take a cylindrical configuration across from the two vertical support members. After the concrete is hardened, the fabric tube can be left in place, or removed at the weld, zipper, or cut with a sharp knife.

BRIEF DESCRIPTION OF THE DRAWINGS

While some of the advantages of the present invention have been set forth above, other advantages will become apparent from the description of the preferred embodiment of this invention when taken in conjunction with the accompanying drawings, in which:

FIGURE 1 is a perspective view of the concrete forming tube used to form a column with a single longitudinal tab;

FIGURE 2 is a perspective view of the concrete forming tube used to form a pad with multiple longitudinal tabs;

FIGURE 3 is a vertical cross section of the tube when expanded with concrete showing two longitudinal tabs, one zipper to enable the form to be reused, and three flexible sheet form elements welded or sewn together;

FIGURE 4 is a perspective view showing the length of tube being cut from a larger package, and the longitudinal tab being stapled to the first vertical support member;

FIGURE 5 is a perspective view showing the second vertical support member being nailed or screwed to the first vertical support member, thereby sandwiching the vertical support tab;

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

FIGURE 1 is a perspective view of a preferred embodiment of a concrete forming tube used in accordance with the present invention as a concrete column and which is indicated generally at **10**. The flexible sheet form element, or fabric **14** is joined to form a tube with the outside longitudinal edge forming a longitudinal tab **16**. The longitudinal tab **16** can be seen at the top, sandwiched between the two vertical support members **18**, **20**. The vertical support members are braced with suitable lumber **22**, and stakes **30** are used to support the lower end of each brace **22**.

In this embodiment, there is only one longitudinal tab **16** on the fabric tube **12**, with the vertical support members and bracing occurring on one side of the tube only. The tube, when filled with concrete **26** will form a cylinder, and center itself directly across from the two vertical support members. Steel reinforcing **24** can be installed in the fabric tube after the form assembly **10** has been set up; or the reinforcing **24** installed first, and the fabric tube **12** slid over the steel.

FIGURE 2 is a perspective view of a preferred embodiment of a concrete forming tube **12** used in accordance with the present invention as a concrete footing pad and which is indicated generally at **28**. Stakes **30** are driven into the ground just outside the circumference of the proposed circular pad **28**. The desired length of fabric tube **42** is cut with a utility knife **52** from the longer length **40**, and the longitudinal tabs **16** are stapled **34** to each stake **30** to support the tube in the correct position. Larger diameter pads could have a multiplicity of longitudinal tabs and supporting stakes. Pads could range in diameter from 450 mm up to 3000 mm, with the fabric tube welded or sewn together to achieve these diameters. Concrete **26** is placed inside the tube, and trowelled flat to the top of the fabric tube **12**.

FIGURE 3 is a cross section of the fabric tube **12** expanded as if by the concrete to show manufacturing details. Three flexible sheet form elements **14** of indefinite length and a specific width are welded or sewn together at points **36** to form the correct diameter for the column or pad. Welding is the preferable method of joining as sewing can weaken the joint and create small holes for the concrete to leak out. The longitudinal tabs run the full length of the tube, with a width **38** running past the joining width **36**. This longitudinal tab is sandwiched between the two vertical support members **18, 20** to support the tube in the vertical position for proper location during the concrete pour. The width of the longitudinal tab **38** is usually the same as the width of the vertical support members **18, 20** to ensure proper positioning of the tab.

The manufacturing process must accurately align and weld the fabric so that the correct diameter of the inflated tube is achieved. As the diameter of the tube increases, the hoop tension of the fabric will increase because of the increased concrete pressure. Therefore the thickness of the fabric and the width of the welded or sewn joint must be correspondingly increased.

A zipper **44** is shown in **FIGURE 3.** The zipper would be used where it is desirable to recycle the tube form to lower forming costs. The zipper would also have applications where it is needed to place a concrete column around an existing steel column, for example to protect a steel column in a warehouse from damage. The fabric overlap **46** protects the zipper from concrete damage when filling with concrete. The zipper would be either welded or sewn to the fabric. Velcro or sticky tape **48** may be required to ensure the overlap stays flat when filling to protect the zipper from concrete damage.

The flexible sheet form element **14** is typically made from a woven polyethylene or polypropylene material, with about 12 tapes per inch in the warp and weft direction. The tapes are high density to achieve strength, and a low-density coating on either or both sides of the scrim could be added to ensure the concrete does not leak through the fabric. It would also be possible to increase the fabric strength by adding warp and weft elements made of carbon fiber, for example, which, when left in place would provide external reinforcing to the concrete.

FIGURE 4 is an isometric view showing the fabric tube **12** being cut to the length **42** of a desired column **10**, and the longitudinal tab **16** being positioned and stapled **34** to the first vertical support member **18**. The tube shape and fabric thickness would only allow the tube to be wound on very large diameter rolls as otherwise the fabric will wrinkle excessively. Therefore packaging of the tube would be on very large rolls and folded, or festooned **40**.

FIGURE 5 is an isometric view showing the second vertical support member **20** being attached to the first member **18** using nails or screws **50**. The two vertical support

members provide support to the longitudinal tab and therefore to the fabric tube during the pouring of concrete.

In the drawings and specification, there has been set forth a preferred embodiment of the invention, and although specific terms are employed, they are used in a generic and descriptive sense only and not purposes of limitation.